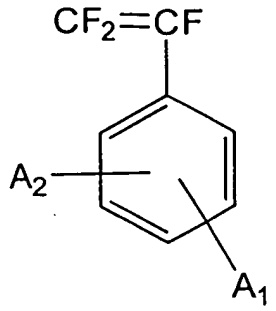
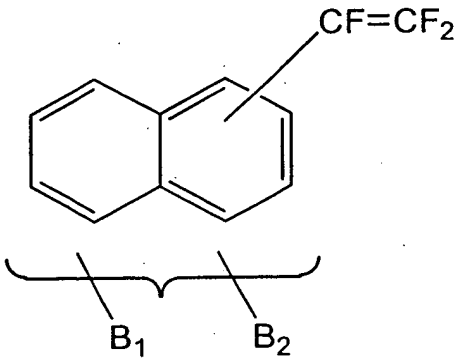
What is claimed is:

1. A membrane comprising a polymeric base film to which has been graft polymerized a monomer selected from the group consisting of monomers of formula (I)



(I)

and formula (II)



(II)

where A_1, A_2, and B_1, B_2 are independently selected from the group of consisting of:

hydrogen, lower alkyl, lower fluoroalkyl, cyclic alkyl, cyclic amine, cyclic ether, cyclic thioether,

Ar, wherein Ar is other than Ph when one of A_1 and A_2 is hydrogen,

CH(X)Ph, where X is selected from the group consisting of hydrogen, fluorine, lower alkyl, lower fluoroalkyl and Ph,

PRR′ and P(OR)(OR′), where R and R′ are independently selected from the group consisting of lower alkyl, cyclic alkyl and Ph, and

wherein at least one of substituents A_1, A_2, B_1 and B_2 is other than hydrogen.

2. The membrane of claim 1 wherein R and R′ are the same moiety.

3. The membrane of claim 1 wherein R and R′ are different moieties.

4. The membrane of claim 1 wherein A_1, A_2, B_1 and B_2 are the same substituent.

5. The membrane of claim 1 wherein at least one of substituents A_1, A_2, B_1 and B_2 differs from at least one of the other substituents.

6. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (I), wherein A_1 is other than hydrogen and A_2 is hydrogen.

7. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (I), wherein A_1 and A_2 are other than hydrogen.

8. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (II) wherein B_1 is other than hydrogen and B_2 is hydrogen.

9. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (II), wherein B_1 and B_2 are both other than hydrogen.

10. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (I) wherein A_1 is selected from the group consisting of lower alkyl and cyclic alkyl, and A_2 is selected from the group consisting of A_1 and hydrogen.

11. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (II) wherein B_1 is selected from the group consisting of lower alkyl and cyclic alkyl, and B_2 is selected from the group consisting of B_1 and hydrogen.

12. The membrane of claim 1 comprising a polymeric base film to which has been graft

polymerized a monomer of formula (I) wherein A_1 is selected from the group consisting of cyclic amine, cyclic ether and cyclic thioether, and A_2 is hydrogen.

13. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (I) wherein A_1 is Ar and A_2 is hydrogen.

14. The membrane of claim 13 wherein Ar is a fused polycyclic aromatic with two fused rings.

15. The membrane of claim 13 wherein Ar is biphenyl.

16. The membrane of claim 13 wherein Ar is a heteroaromatic group.

17. The membrane of claim 16 wherein Ar is a heteroaromatic group containing at least one heteroatom, wherein said at least one heteroatom is selected from the group consisting of nitrogen, oxygen and sulfur.

18. The membrane of claim 17 wherein said heteroaromatic group contains at least two of said heteroatoms.

19. The membrane of claim 18 wherein said heteroatoms are the same moiety.

20. The membrane of claim 18 wherein at least one of said heteroatoms differs from the other of said heteroatoms.

21. The membrane of claim 17 wherein at least one of said heteroatoms is selected from the group consisting of N-alkylated nitrogen and N-benzylated nitrogen.

22. The membrane of claim 17 wherein said heteroaromatic group is monocyclic.

23. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (I) wherein A_1 is selected from the group consisting of PRR' and P(OR)(OR'), where R and R' are independently selected from the group consisting of lower alkyl, cyclic alkyl and Ph, and A_2 is hydrogen.

24. The membrane of claim 23 wherein R and R' are the same moiety. correct

25. The membrane of claim 23 wherein R and R' are different moieties.

26. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (I) wherein A_1 is selected from the group consisting of Me and

CH(X)Ph, where X is selected from the group consisting of hydrogen, fluorine, Me and Ph, and A_2 is a selected from the group consisting of A_1 and hydrogen.

27. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (II) wherein B_1 is selected from the group consisting of Me and CH(X)Ph, where X is selected from the group consisting of hydrogen, fluorine, Me and Ph, and B_2 is hydrogen.

28. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (I) wherein A_1 is Me and A_2 is selected from the group consisting of Me and hydrogen.

29. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (II) wherein B_1 is Me and B_2 is selected from the group consisting of Me and hydrogen.

30. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (I) wherein A_1 is para-Me, A_2 is hydrogen, and said base film comprises poly(ethylene-co-tetrafluoroethylene).

31. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (II) wherein B_1 is Me, B_2 is hydrogen, and said base film comprises poly(ethylene-co-tetrafluoroethylene).

32. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized one monomer selected from the group consisting of said monomers of formula (I) and formula (II), whereby the grafted chains are homopolymeric.

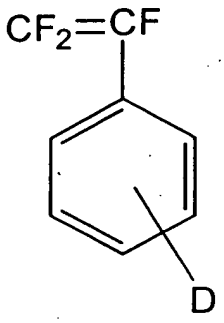
33. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized more than one monomer selected from the group consisting of said monomers of formula (I) and formula (II), whereby said grafted chains are copolymeric.

34. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized more than one monomer of formula (I), whereby the grafted chains are copolymeric.

35. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized more than one monomer of formula (II), whereby the grafted chains are copolymeric.

36. The membrane of claim 1 comprising a polymeric base film to which has been graft polymerized a monomer of formula (III) with said

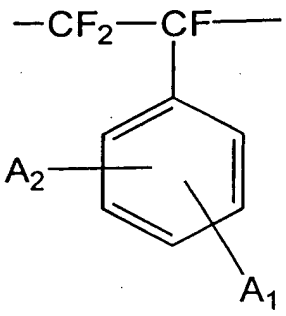
monomers selected from the group consisting of monomers of formula (I) and formula (II):



(III)

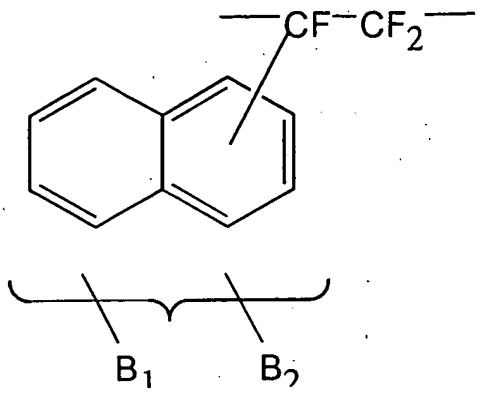
where D is selected from the group consisting of hydrogen, fluorine, CF_3, CF_2H, $CF=CF_2$, SO_2F and $SO_3^-M^+$.

37. A membrane comprising a polymeric base film with grafted chains comprising monomer units selected from the group consisting of monomer units of formula (IV)



(IV)

and formula (V)



(V)

where A_1, A_2, and B_1, B_2 are independently selected from the group consisting of:

hydrogen, lower alkyl, lower fluoroalkyl, cyclic alkyl,

cyclic amine, cyclic ether, cyclic thioether,

Ar, wherein Ar is other than Ph when one of A_1 and A_2 is hydrogen,

CH(X)Ph, where X is selected from the group consisting of hydrogen, fluorine, lower alkyl, lower fluoroalkyl and Ph,

PRR′ and P(OR)(OR′), where R and R′ are independently selected from the group consisting of lower alkyl, cyclic alkyl and Ph,

and wherein at least one of substitutents A_1, A_2, B_1 and B_2 is other than hydrogen.

38. The membrane of claim 37 wherein R and R′ are the same moiety.

39. The membrane of claim 37 wherein R and R′ are different moieties.

40. The membrane of claim 37 wherein at least one of A_1, A_2, B_1 and B_2 are the same substituent.

41. The membrane of claim 37 wherein at least one of substituents A_1, A_2, B_1 and B_2 differs from at least one of the other substituents.

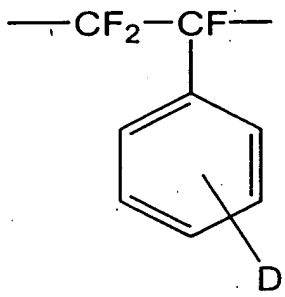
42. The membrane of any one of claims 1, 28-31, 36 and 37 wherein at least a portion of the grafted chains is crosslinked.

43. The membrane of claim 37 wherein at least a portion of said monomer units further comprise at least one ion-exchange substituent, thereby rendering said membrane an ion-exchange membrane.

44. The ion-exchange membrane of claim 43 wherein said at least one ion-exchange substituent is selected from the group consisting of sulfonate and sulfonic acid.

45. The ion-exchange membrane of claim 43 comprising a polymeric base film with grafted chains further comprising monomer units of formula (VI) in addition to said monomer units selected

from the group consisting of monomer units of formula (IV) and formula (V):



(VI)

where D is selected from the group consisting of hydrogen, fluorine, CF_3, CF_2H, $CF=CF_2$, SO_2F and $SO_3^-M^+$.

46. The ion-exchange membrane of claim 43 wherein at least a portion of said monomer units comprise at least two ion-exchange substituents.

47. The ion-exchange membrane of claim 43 wherein at least 50% of said monomer units in said grafted chains have at least one ion-exchange substituent per monomer unit.

48. The ion-exchange membrane of claim 43 wherein said grafted chains comprise at least two different types of ion-exchange groups.

49. The ion-exchange membrane of claim 43 wherein said grafted chains comprise an anion-exchange group and a cation-exchange group.

50. The ion-exchange membrane of any one of claims 43 and 45 wherein at least a portion of the grafted chains is crosslinked.

51. The ion-exchange membrane of claim 43 wherein said ion-exchange membrane is substantially gas impermeable.

52. The ion-exchange membrane of claim 44 wherein said ion-exchange membrane is substantially gas impermeable.

53. The ion-exchange membrane of claim 43 wherein said monomer units are of formula (IV).

54. The ion-exchange membrane of claim 53 wherein A_1 is selected from the group consisting of Me and CH(X)Ph, where X is selected from the group consisting of hydrogen, fluorine, Me and Ph, and A_2 is selected from the group consisting of A_1 and hydrogen

55. The ion-exchange membrane of claim 53 wherein A_1 is Me and A_2 is selected from the group consisting of Me and hydrogen.

56. The ion-exchange membrane of claim 53 wherein A_1 is para-Me, A_2 is hydrogen, said base film comprises poly(ethylene-co-tetrafluoro-ethylene), and said at least one ion-exchange

substituent is selected from the group consisting of a sulfonate group and a sulfonic acid group.

57. The ion-exchange membrane of claim 43 wherein said monomer units are of formula (V).

58. The ion-exchange membrane of claim 57 wherein B_1 is selected from the group consisting of Me and CH(X)Ph, where X is selected from the group consisting of hydrogen, fluorine, Me and Ph, and B_2 is hydrogen.

59. The ion-exchange membrane of claim 57 wherein B_1 is Me and B_2 is selected from the group consisting of Me and hydrogen.

60. The ion-exchange membrane of claim 57 wherein B_1 is Me, B_2 is hydrogen, said base film comprises poly(ethylene-co-tetrafluoroethylene), and said at least one ion-exchange substituent is selected from the group consisting of a sulfonate group and a sulfonic acid group.

61. An electrode apparatus comprising the ion-exchange membrane of claim 51.

62. An electrode apparatus comprising the ion-exchange membrane of claim 52.

63. A membrane electrode assembly comprising the ion-exchange membrane of claim 51.

64. A membrane electrode assembly comprising the ion-exchange membrane of claim 52.

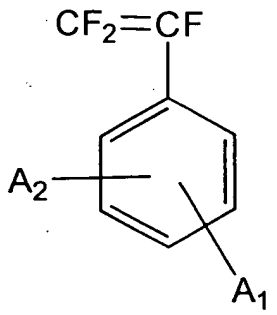
65. An electrochemical fuel cell comprising the ion-exchange membrane of claim 51.

66. An electrochemical fuel cell comprising the ion-exchange membrane of claim 52.

67. An electrochemical fuel cell according to any one of claims 65 and 66 wherein said polymeric base film is less than 100 μm thick.

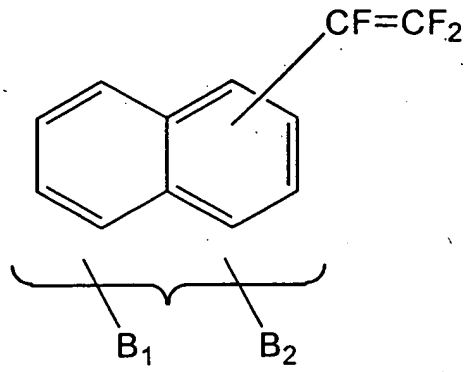
68. A membrane prepared by subjecting the membrane of claim 1 to a reaction process selected from the group consisting of halomethylation, sulfonation, phosphonation, amination, carboxylation, hydroxylation and nitration.

69. A method of preparing a membrane, the method comprising graft polymerizing to a polymeric base film a monomer selected from the group consisting of monomers of formula (I)



(I)

and formula (II)



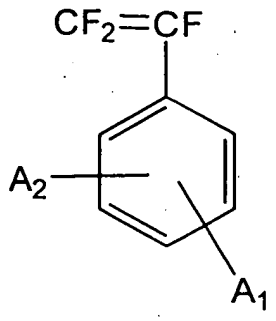
(II)

wherein, in the selected monomer, at least one of substitutents A_1, A_2, and B_1, B_2 is a non-hydrogen substituent that activates said monomer with respect to said graft polymerization, and said method further comprises:

introducing a sulfonate group into at least a portion of said graft polymerized monomer units; and

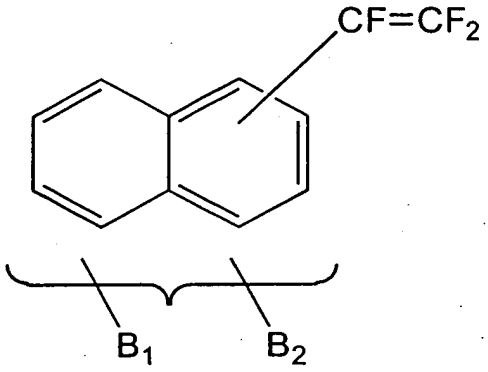
converting at least a portion of said non-hydrogen substituents to substituents that are deactivating with respect to desulfonation.

70. A method of preparing a membrane, said method comprising graft polymerizing to a polymeric base film a monomer selected from the group consisting of monomers of formula (I)



(I)

and formula (II)



(II)

where A_1, A_2, and B_1, B_2 are independently selected from the group consisting of:

hydrogen, lower alkyl, lower fluoroalkyl, cyclic alkyl,

cyclic amine, cyclic ether, cyclic thioether,

Ar, wherein Ar is other than Ph when one of A_1 and A_2 is hydrogen,

CH(X)Ph, where X is selected from the group consisting of hydrogen, fluorine, lower alkyl, lower fluoroalkyl and Ph,

PRR′ and P(OR)(OR′), where R and R′ are independently selected from the group

consisting of lower alkyl, cyclic alkyl and Ph, and

wherein at least one of substitutents A_1, A_2, B_1 and B_2 is other than hydrogen.

71. The membrane of claim 70 wherein R and R' are the same moiety.

72. The membrane of claim 70 wherein R and R' are different moieties.

73. The membrane of claim 70 wherein A_1, A_2, B_1 and B_2 are the same substituent.

74. The membrane of claim 70 wherein at least one of A_1, A_2, B_1 and B_2 differs from at least one of the other substituents.

75. The method of claim 70 wherein A_1 and B_1 are independently selected from the group consisting of:

Ar, where Ar is selected from the group consisting of monocyclic heteroaromatics, fused polycyclic heteroaromatics, and heteroaromatic ring assemblies having at least one nitrogen atom,

cyclic amine, and

phosphines of the formula PRR' and phosphites of formula P(OR)(OR'), where R and R' are independently selected from the group

consisting of lower alkyl, cyclic alkyl and Ph, and

A_2 and B_2 are hydrogen,

the method further comprising subjecting at least a portion of any one of the nitrogen atoms of the Ar, the nitrogen atoms of the cyclic amine and the phosphorus atoms of one of the phosphine and the phosphite to one of alkylation and benzylation.

76. The membrane of claim 75 wherein R and R′ are the same moiety.

77. The membrane of claim 75 wherein R and R′ are different moieties.

78. A method according to claim 70, wherein A_1 and B_1 are independently selected from the group consisting of:

phosphines of the formula PRR′ and phosphites of formula P(OR)(OR′), where R and R′ are independently selected from the group consisting of lower alkyl, cyclic alkyl and Ph, and

A_2 and B_2 are hydrogen,

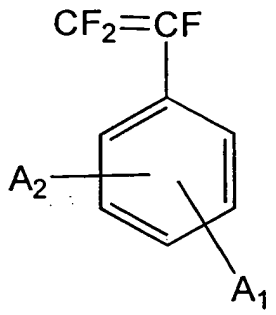
the method comprising the sequential steps of introducing a nitro group into at least a portion of the grafted monomer units of the membrane and converting at least a portion of the nitro groups to quaternary ammonium groups,

the method optionally further comprising converting one of the phosphine and the phosphite to an ion-exchange substituent.

79. The membrane of claim 78 wherein R and R' are the same moiety.

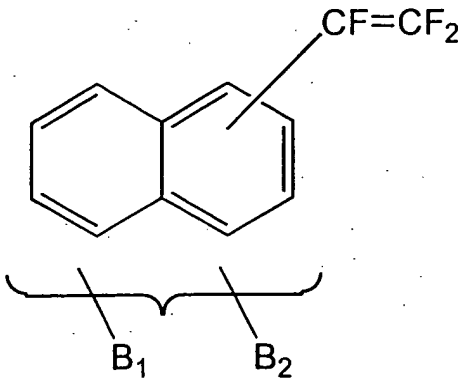
80. The membrane of claim 78 wherein R and R' are different moieties.

81. A method of preparing a membrane comprising graft polymerizing to a polymeric base film a monomer selected from the group consisting of monomers of formula (I)



(I)

and formula (II)



(II)

where A_1 and B_1 are independently selected from the group consisting of:

PRR', P(OR)(OR'), and SR, where R and R' are independently selected from the group consisting of lower alkyl, cyclic alkyl and Ph, and

A_2 is selected from the group consisting of A_1 and hydrogen, and B_2 is selected from the group consisting of B_1 and hydrogen,

the method further comprising subjecting at least a portion of one of the PRR', the P(OR)(OR') and the SR groups to oxidation.

82. The membrane of claim 81 wherein R and R' are the same moiety.

83. The membrane of claim 81 wherein R and R' are different moieties.

84. The method of claim 81 further comprising introducing ion-exchange substituents into at least a portion of said monomer units.

85. The method of claim 81, wherein A_1 and B_1 are independently SR, where R is selected from the group consisting of lower alkyl, cyclic alkyl and Ph, and A_2 is selected from the group consisting of A_1 and hydrogen, and B_2 is selected from the group consisting of B_1 and hydrogen, and wherein the method comprises converting at least a

portion of the SR groups to at least one of sulfonate and sulfonic acid groups.